### Accepted Manuscript

### Research paper

To appear in:

Controlling drug release from mesoporous silica through an amorphous, nanoconfined 1-tetradecanol layer

Raul-Augustin Mitran, Cristian Matei, Daniela Berger, Laura Băjenaru, Mihaela G. Moisescu

PII:	\$0939-6411(17)31057-3
DOI:	https://doi.org/10.1016/j.ejpb.2018.02.020
Reference:	EJPB 12700

European Journal of Pharmaceutics and Biopharmaceutics

Received Date:14 September 2017Revised Date:30 December 2017Accepted Date:16 February 2018

<page-header><image><section-header><section-header><section-header><section-header><section-header>

Please cite this article as: R-A. Mitran, C. Matei, D. Berger, L. Băjenaru, M.G. Moisescu, Controlling drug release from mesoporous silica through an amorphous, nanoconfined 1-tetradecanol layer, *European Journal of Pharmaceutics and Biopharmaceutics* (2018), doi: https://doi.org/10.1016/j.ejpb.2018.02.020

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

## **ACCEPTED MANUSCRIPT**

# Controlling drug release from mesoporous silica through an amorphous, nanoconfined 1-tetradecanol layer

Raul – Augustin MITRAN<sup>a,b</sup>, Cristian MATEI<sup>b</sup>, Daniela BERGER<sup>b\*</sup>, Laura BĂJENARU<sup>b</sup>, Mihaela G. MOISESCU<sup>c</sup>

<sup>a</sup>"Ilie Murgulescu" Institute of Physical Chemistry, Romanian Academy of Sciences, 202 Splaiul Indepedentei, Bucharest, 060021, Romania

<sup>b</sup>University "Politehnica" of Bucharest, Faculty of Applied Chemistry and Material Science, 1-7 Polizu street, Bucharest, 011061, Romania

<sup>c</sup>"Carol Davila" University of Medicine and Pharmacy, Biophysics and Cellular Biotechnology Dept., 8 Eroii Sanitari Blvd. Bucharest, 050474, Romania

<sup>d</sup>"Carol Davila" University of Medicine and Pharmacy, Excellence Research Center in Biophysics and Cellular Biotechnology, 8 Eroii Sanitari Blvd. Bucharest, 050474, Romania

**Abstract**: Mesoporous silica materials are promising nano-carriers for drug delivery systems. Even though there are many strategies for controlling the drug release kinetics, these must be adapted through trial and error on a case-by-case basis. Here we explore the possibility of tailoring the release kinetics of hydrophilic, water soluble therapeutic agents from mesoporous silica through addition of a hydrophobic excipient, 1-tetradecanol. *In vitro* drug release experiments performed at 37 °C, in phosphate buffer solution (pH 7.4) show that the addition of tetradecanol yields slower drug release kinetics, which was correlated with the presence of a liquid fatty alcohol interfacial layer. The layer mass is 11-23 % wt. of the metoprolol-loaded silica sample, and it causes up to 1.6 times decrease of initial release rate with respect to materials without the fatty alcohol. This effect does not depend of carrier pore arrangement, being noticed for both hexagonal MCM-41 and cubic KIT-5 mesoporous silica. The toxicity of tetradecanol-containing materials was evaluated by formazan-based viability assay on Opossum kidney epithelial cell line, and no significant toxicity was observed.

Keywords: mesoporous silica, interfacial layer, controlled release, tetradecanol, drug delivery systems

#### 1. Introduction

<sup>&</sup>lt;sup>\*</sup> Corresponding author. E-mail: danaberger01@yahoo.com

Download English Version:

## https://daneshyari.com/en/article/8412014

Download Persian Version:

https://daneshyari.com/article/8412014

Daneshyari.com